

REMARKS

I. **INTRODUCTORY REMARKS**

Reconsideration and allowance are respectfully requested. This Rule 116 Amendment is being resubmitted with an RCE. The Applicants thank the Examiner for his examination to date and invite the Examiner to resolve remaining issues with the undersigned by telephone as necessary.

In the January 19, 2007 final office action, the Examiner rejected claims 1-3, 6-13, 16-47, 49-50, 66-73, and 98-101. The Applicants believe that all amendments submitted herein were within the purview of Rule 116. For example, the present amendments merely simplify issues for appeal and do not require new searching. The Examiner is requested to contact the undersigned if he believes differently.

Only one issue now remains after the present amendments: obviousness.

After this Amendment, the only present independent claims are claims 1, 40, and 47, as explained below.

Before this Amendment, there were four independent claims: 1, 40, 47, and 66. The Applicants presently amend independent claims 1, 40, and 47 to recite sol-gel material, a term taken from dependent claims 24, 43, 50, and 73. Therefore, this amendment does not introduce new matter as sol-gel was described throughout the filed specification and in the filed claims 24, 43, 50, and 73. Dependent claims 24, 43, 50, and 73 are cancelled.

Former independent claim 66 has been amended to now be a dependent claim.

Claim 101 is amended for clarity.

The Applicants also cancel withdrawn claims 4-5, 74-78, and 83-97.

The Applicants clarify that claim 14 is cancelled. Claims 16, 26-28, 42, and 49 are also cancelled.

The Examiner rejected claim 6 as being indefinite. While the Applicants traverse this rejection, the Applicants cancel claim 6 herein to simplify issues for appeal.

The Applicants herein address the drawings and specification issues raised by the Examiner. The applicants submit again Figures 19 and 21 with the hope that the PTO scanning process does not interfere with their clarity. The Examiner should contact the undersigned if any more problems are deemed present. The applicants believe that this issue should not prevent allowance.

II. RESPONSE TO PRIOR ART REJECTIONS

The Applicants have taken major steps to substantially simplify the issues. The Examiner cited at least seven references in at least seven separate rejections. The applicants respectfully traverse each of these rejections. However, the applicants believe that in view of the present amendments, the prior art issues reduce for purposes of appeal to those rejections and references relevant to now cancelled dependent claims 24, 43, 50, and 73, which had recited sol-gel material. The three references used against these claims in the office action were: (i) Lewis et al. article, October 25, 1999, 2689, *Applied Physics Letters* (“Lewis”), (ii) US Patent No. 5,871,869 (“Park”), and (iii) US Patent No. 6,270,946 (“Miller”). The other references were not cited against these claims and are deemed therefore to no longer be an issue.

Therefore, prosecution has now reduced to one issue: whether the subject matter of the presently pending claims, including independent claims 1, 40, and 47 would have been obvious over the combined teachings of Lewis, Park, and/or Miller. The Applicants respectfully assert that anticipation is no longer an issue.

For reasons explained below, the claimed subject matter would not have been obvious because even if the references are combined for sake of argument, the claimed invention is not arrived at. A missing element is present, so no prima facie obviousness can be present. Moreover, no motivation is present to combine the references, even if it is asserted that there is no missing element for sake of argument.

The References Fail to Teach at Least One Claim Element

Claim 1 recites that the method uses deposited materials for additive repair of a defective mask. In other words, the deposited material is formulated for additive repair of a defective mask in need of an additive repair. None of the references recite additive repair of a defective mask, the defective mask itself in need of additive repair, and the materials needed for same.

Lewis only describes and enables subtractive repair. Lewis teaches etching away and removing chrome material with use of a liquid etchant (the liquid etchant is of course removed and not a permanent addition to the surface). Lewis does not teach or suggest adding material adapted for additive repair. Lewis' teachings about chemistry simply are not specific enough to reach additive repair.

Miller and Park also fails to teach additive repair of a defective mask. The references make no mention of providing a mask in need of additive repair and materials able to repair the mask in a functionally useful way.

Hence, a missing element is present. Even if all of these references are combined for sake of argument, the claimed invention is not arrived at. None of the references provide the defective mask in need of additive repair.

In the office action (pages 8-9), the Examiner appear to rely on inherency in showing that Lewis can teach additive repair. The applicants respectively disagree that inherency can be used in this context. First, inherency requires that the inherent feature necessarily be present in the prior art. Here, in stark contrast, Lewis repeatedly focuses on subtractive repair, the exact opposite of additive repair. Lewis does not expressly or inherently provide a defective mask in need of additive repair. Additive repair is not necessarily present in any Lewis teaching. Lewis provides no specific guidance, suggestion, or enablement on how its methods can be used for additive repair. Indeed, the Examiner correctly states in the Office Action, page 10 that "Lewis et al. do not teach specific examples or any detailed description of such additive repair for patterned masks." In this context, inherency is not relevant. Second, inherency is most frequently and soundly used in an anticipation rejection, not an obviousness rejection. Indeed, the Examiner resorted to inherency while maintaining a 102(b) anticipation rejection. Now, however, the only issue is obviousness. Again, inherency is not relevant now in this context.

In the office action, the Examiner also at pages 9-12 appears to say that the combination of Lewis and Miller somehow teach additive repair of a defective mask. The combination of Lewis and Miller, however, do not teach additive repair. The deficiencies of Lewis are stated above. Lewis does not teach the defective mask in need of additive repair. Similarly, Miller simply fails to teach additive repair of a defective mask. When the Examiner states on page 10 that “Lewis et al. do not teach specific examples or any detailed description of such additive repair for patterned masks.”, the Examiner should also say this about Miller. Miller does not teach specific examples or any detailed description of additive repair of patterned masks having defects. Miller, moreover, provides no working examples. Miller is a paper patent devoid of specific teachings. Miller provides no specific description or examples of any ink formulations for mask repair beyond the general, vague notion of a difunctional monomer, oligomer, or polymer molecules comprising functional groups (col. 2, lines 39-67). Miller does not teach or suggest an appropriate carrier system or solvent system for its difunctional molecules. Miller’s molecules would simply clog nanoscopic openings without an adequate carrier system or solvent system. Indeed, Miller is trying to avoid anything to do with masks so as to “provide a method to directly fabricate nanoscale electronic devices without using a mask.” (col. 1, lines 42-48).

This record, therefore, presents a missing element: no additive repair is taught, wherein a defective mask receives material which adds to the mask and fixes a repair.

Finally, independent claims 40 and 47 also recites use of patterning compound for additive repair. The arguments noted above for claim 1 also apply to claims 40 and 47.

Other missing elements can be also present.

No Motivation is Present to Combine References

In addition, no motivation is present to combine any of the three references, or subcombinations thereof, even if it is assumed that there is no missing element for sake of argument. Any combination of these three references reflects impermissible hindsight. No motivation is present to combine Lewis and Park, or the combination of Lewis, Miller, and Park.

First, the inventors faced a problem associated with additive repair of masks. None of the references teach or suggest additive repair of masks. Hence, one would not turn to any of these references, let alone combine them. Materials useful for subtractive repair are not useful for additive repair, and vice-versa. For example, one reference provided herewith teaches that additive repair is more difficult:

The repair of opaque defects (i.e., removal of chromium spots from areas in which they do not belong) has been performed with lasers for many years (i.e. *laser zappers*). The repair of *clear defects* (i.e. the deposition of chromium in areas from which it should be missing) has proven more difficult. *Silicon Processing for the VLSI Era*, page 486.

In contrast, the primary reference, Lewis, teaches subtractive repair, directly opposite to additive repair. Lewis teaches away. If for sake of argument one assumes Miller says anything about additive repair, one would not combine a subtractive repair reference (Lewis) with a hypothetically additive repair reference (Miller). Moreover, Lewis teaches depositions of etching liquids which are a combination of cyanide, hydroxide, and water (page 2690, bottom left). Miller does not teach deposition of etching liquids but only vaguely teaches somehow depositing monomer, oligomer, or polymer which is functionalized and which does not need solvent – very different from an etching liquid with a different purpose. Lewis says nothing about use of functionalized materials. In contrast, Miller requires functionalized materials. Incorporating the teachings of Lewis into Miller destroys Miller, and incorporating the teachings of Miller into Lewis would destroy Lewis. Therefore, motivation to combine these references is not present.

Furthermore, Park teaches nothing about repair of masks, let alone additive repair, or use of nanoscale tip methods such as scanning probe or AFM methods for same. Hence, one would not combine Park with Lewis. Park merely teaches how to fabricate a mask using unspecified methods to deposit sol gel layer without use of tip patterning. Lewis requires use of a tip for patterning. Park requires a relatively thick film (1,400-3,100 angstroms) in the first steps of the process in contrast to Lewis which does not recite any need for film thickness as Lewis is subtractive repair only. One would not use a tip in Lewis to carry out Park, trying to form a thick

patterned film, as this would not be practical at first blush in a fast fabrication process. One would not use the generic deposition methods of Park to execute Lewis subtractive repair.

Moreover, the sol-gel materials as presently claimed and as taught in Park would be expected to clog and prevent fluid flow in the very small diameter nanopipette openings as taught in Lewis. Sol-gel materials are designed to react to form particles and solids, so one would not want to use a Lewis device with nanoscale opening. Therefore, one would not be motivated to combine Park with Lewis or vice-versa.

Similarly, one would not combine Miller with Park for reasons analogous to not combining Park with Lewis. Moreover, Miller is directly teaching away from mask based processes, and Park teaches mask processes. The tip-based method of Miller works against Park, which needs a fast even film as part of a microfabrication process.

In sum, no motivation is present to combine references.

Concluding Remarks

In a nutshell, the Applicants have found an inventive sol-gel approach to additive mask repair which is not taught or suggested by these references, individually or in combination. Sol gel materials and additive repair are not compatible with Lewis. The Lewis devices would clog.

The Examiner is also invited to examine the merits of the dependent claims separately.

Finally, the Applicants believe that the remaining references in the office action (Cohen, Bard, and Yedur) do not teach or suggest sol-gel approaches to additive repair.

For the record on appeal, as needed, the Applicants incorporate by reference their prior remarks about patentability into this Amendment.

If the Examiner has any questions or comments about the present Amendment, he is invited to contact the undersigned to efficiently resolve any issues.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 CFR §§ 1.16-1.17, or any other provision, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or

informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741.

Respectfully submitted,

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